Developing an Open Source Option for NASA Software

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Overview

- What is Open Source software?
- Ames Open Source working group
- “Developing an Open Source Option … ”
- NASA Open Source Agreement (NOSA)
- NASA OS on the web
- Example: WorldWind

What is Open Source Software?

- Software that includes source code
- OS agreements grant certain rights:
  - use (execute) the code
  - modify
  - redistribute
- Agreements tend to vary a bit with respect to terms of redistribution
- Open Source Initiative (OSI) acts as arbiter of definitions, usage agreements

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Where is OS Software?

- Industry, government, academia
- most Internet infrastructure
- much of high-end computing software
- over 77K projects at one leading site alone (SourceForge)
- Mac OS X (Open BSD)

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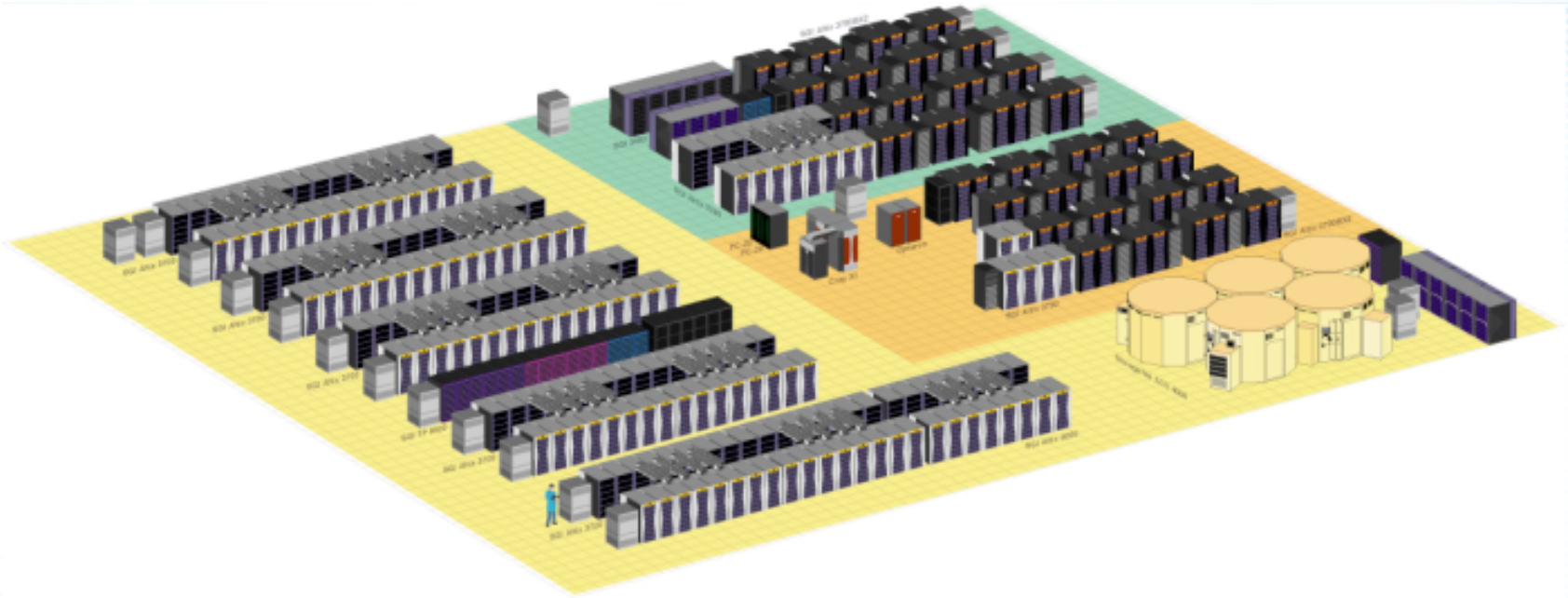
Project Columbia

- SGI Altix system at Ames: Linux
- 20 512-Itanium boxes: 10240 processors



Use vs. Release

- We are interested in Open Source *release* of NASA-authored software
- For some government agencies, the debate is over the *use* of OS software
- For us (Information Technology Directorate), *use* of OS software a given
  - long tradition of Unix systems
  - most of Unix community has moved to Linux

Report on DoD Use of "FOSS"

- "Use of Free and Open-Source Software (FOSS) in the U.S. Department of Defense" by Terry Bollinger of Mitre, 1/03
- "FOSS plays a more critical role in the DoD than has generally been recognized"
  - Found use of 115 FOSS applications in DoD, 251 examples of their use
- Advocates use FOSS to promote diversity
- See also: egovos.org

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Ames OS Working Group

- Ames convenes a working group to develop an OS release process, 5/02:
  - Information Technology directorate chief, deputy directorate chief
  - Ames Chief Patent Counsel
  - Ames Software Release Authority
  - IT directorate technical staff members

“Developing an Open Source Option for NASA Software”

- Presented before working group: 2/03
- Published as a NAS technical report: 4/03
  - NAS-03-009, available on the web
- Noted by Slashdot: 5/03
- Noted other NASA centers & HQ: 6/03
- ...

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“Developing an OS Option ...”

- Marshaled arguments in favor of an OS option, from a variety of perspectives
- Provided a comparison of some of the leading usage agreements
- Discussed NPG 2210.1 (External Release of NASA Software) issues w.r.t. OS
- Proposed Mozilla license as a model
- Nine appendices -- 52 pages total

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“Developing an OS *Option* …”

- page 3:

  We say *option* because we are not proposing that *all* NASA software be released Open Source. We recognize that some software, because of export control, ownership or commercialization concerns, may not be suitable for Open Source.

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NASA Perspective

- The “National Aeronautics and Space Act of 1958” (NASA charter) directs NASA to:
  - plan, direct, and conduct aeronautical and space activities;
  - ...
  - *provide for the widest practicable and appropriate dissemination of information concerning [NASA’s] activities and the results thereof;*

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NASA Perspective (2)

- The NASA mission:
  - To understand and protect our home planet,
  - To explore the universe and search for life,
  - To inspire the next generation of explorers … as only NASA can.
- To accomplish the first two items, NASA will need to work with other entities
- For the third, need effective dissemination

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NASA Perspective (3)

- Intellectual Property (IP) rights and ownership issues can be a significant stumbling block:
  - mix of civil servant and contractor authors
  - software projects with multiple contractors
  - projects that outlast contractor tenure
  - external collaborations difficult
- These issues will continue to arise
  - e.g., with respect to the Ames UARC

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Software Users' Perspective

- Decision to use a software package based on many factors:
  - fitness for a particular use
  - cost
  - expectations w.r.t. provider longevity
- The longevity issue tends to come up more often in research environments
  - more use of software from small entities
  - do not want to be left with no recourse

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Developers' Perspective

- Software developers are necessarily software users
- Developers' motivations much the same as for traditional publishing:
  - peer review, feedback
  - community recognition
  - foster collaborations
- *Software release is essentially a type of publishing in IT research*

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PITAC Perspective

- President's Information Technology Advisory Committee (2000)
- Participants from industry, gov't, academia
  - including NASA (NAS division chief)
- Three recommendations:
  - encourage OS software development
  - establish "level playing field" for procurement
  - do an analysis of OS agreements

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Larry Smarr Perspective

- Founder of the National Center for Supercomputing Applications (NCSA)
  - birthplace of HDF, Mosaic, among other things
- In Salon.com (1/02):

Some universities are dead set against giving [software code] away. But I don't think universities should be in the moneymaking business. They ought to be in the changing-the-world business, and Open Source is a great vehicle for changing the world.

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Computing Research Association Perspective

- “IT IP generated by universities is overvalued by commercialization and licensing officials; it is fundamentally different from pharmaceutical and agricultural IP, which have been a significant source of income.”
- IT researchers have more to lose than to gain by the establishment of high barriers to industry access to IT IP.

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Dep't of Energy Perspective

- ASCI / ASCR programs:
  - software produced in work funded by these programs: OS by default
- Note that these programs support weapons work
- DOE has also released some codes under the LGPL

Impact of "Developing … "

- Similar to the types of impact we hope to achieve publishing research articles:
  - peer review
  - community recognition and excitement
  - fostering collaborations
- Provided some catalyst for legal team to move forward on NASA OS agreement
- Visibility in NASA outside of Ames

slashdot.org

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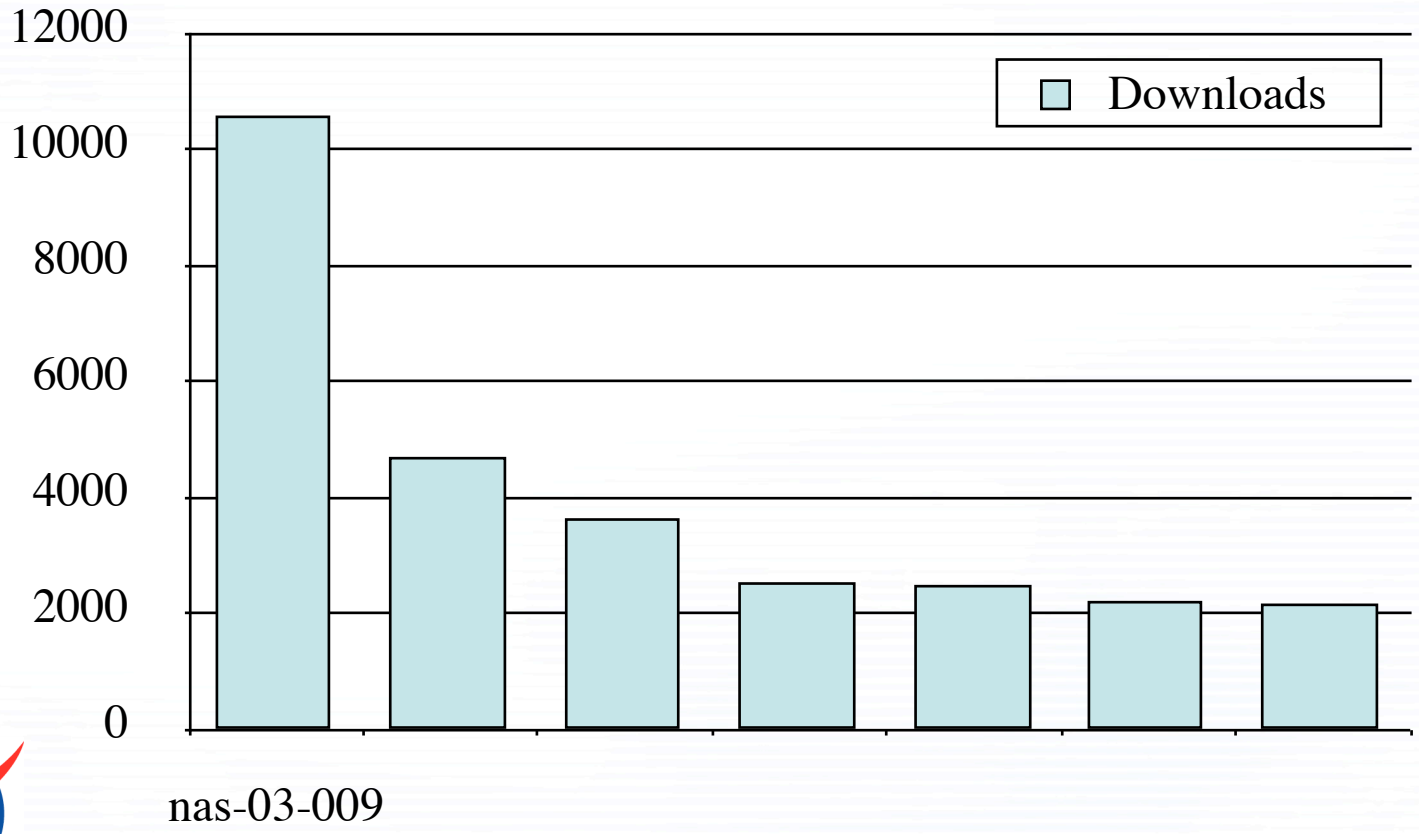
Impact of slashdot

- Downloads of nas-03-009 over twice that of any other document on our server



NASA Open Source Agreement

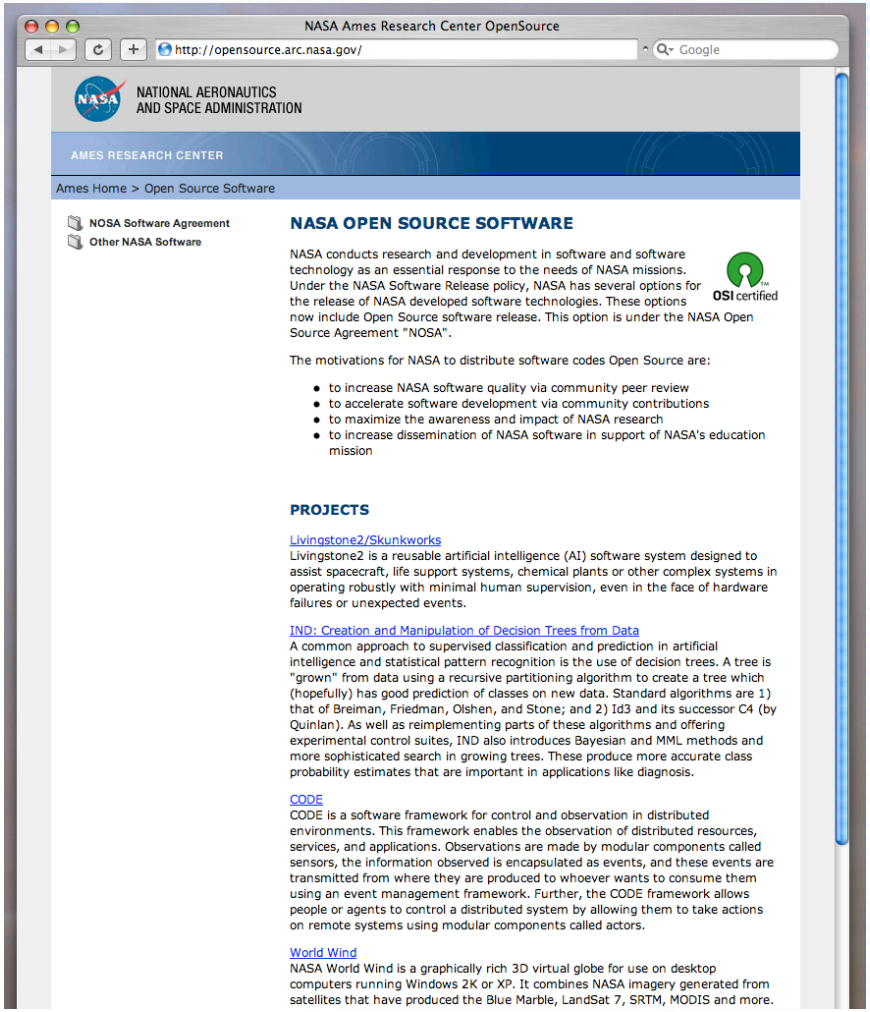
- NASA Open Source legal team:
  - ARC: R. Padilla
  - GSFC: B. Geurts, D. Cox (now at ARC)
  - other NASA centers ...
- Open Source Initiative certified

- OSI asked that NOSA be generalized so that it may work for other gov't agencies
- NASA prefers "agreement" to "license"

NASA OS on the Web

- Web site provides “one stop shopping”
- We considered opensource.nasa.gov
  - easier to get opensource.*.nasa.gov
  - deferred on agency-wide URL for the moment
- Downloader registration:
  - registration is optional, cannot be mandatory, per OSI OS definition
- JPL: OS, but not via an opensource.* site

opensource.arc.nasa.gov



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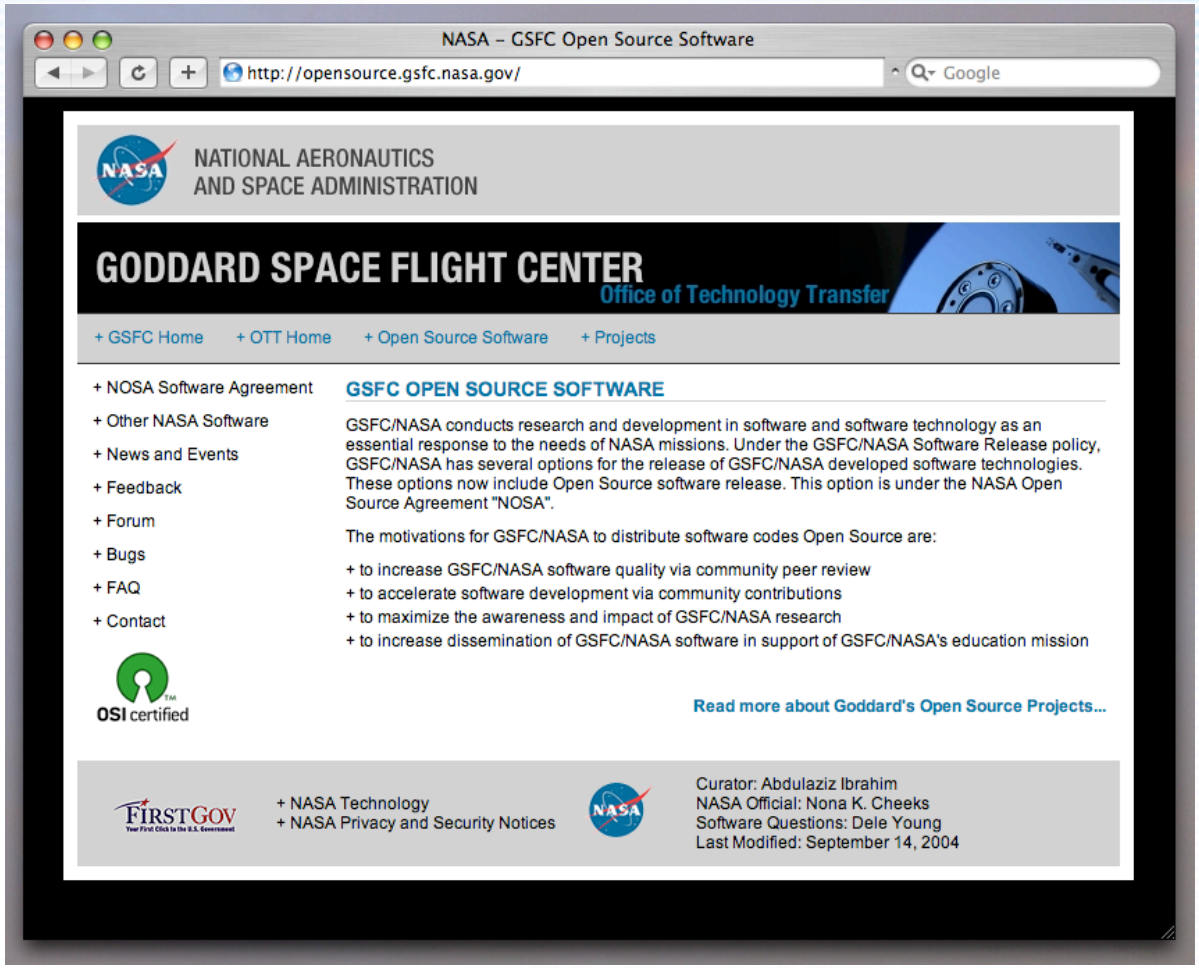
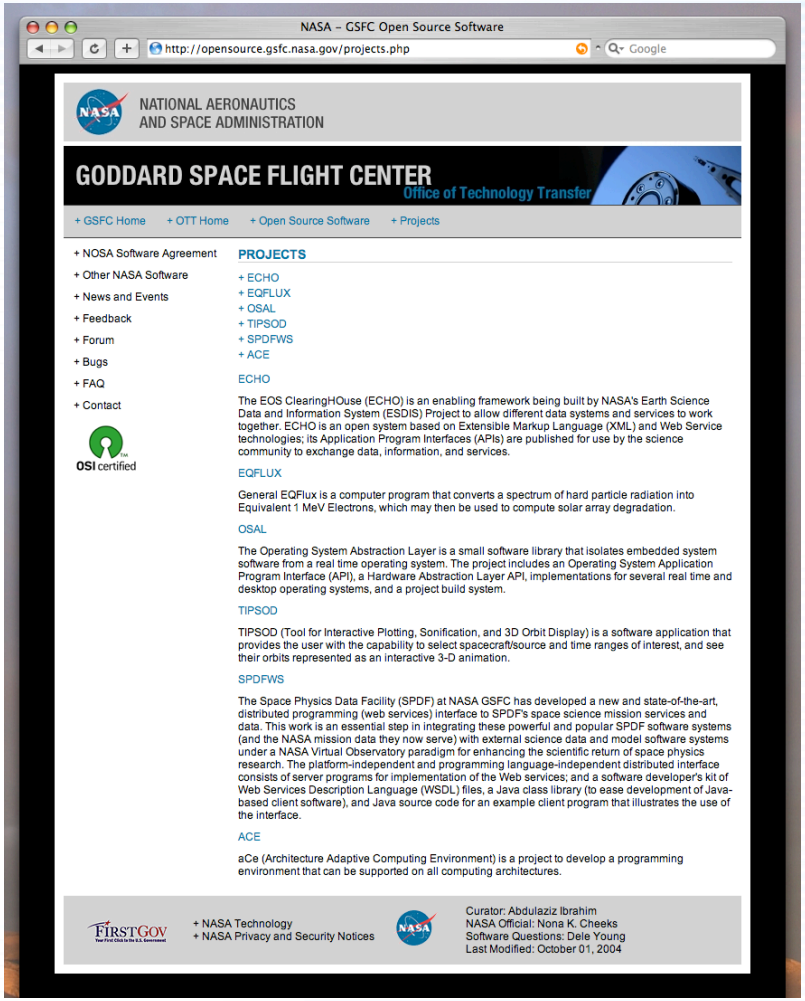
opensource.gsfc.nasa.gov

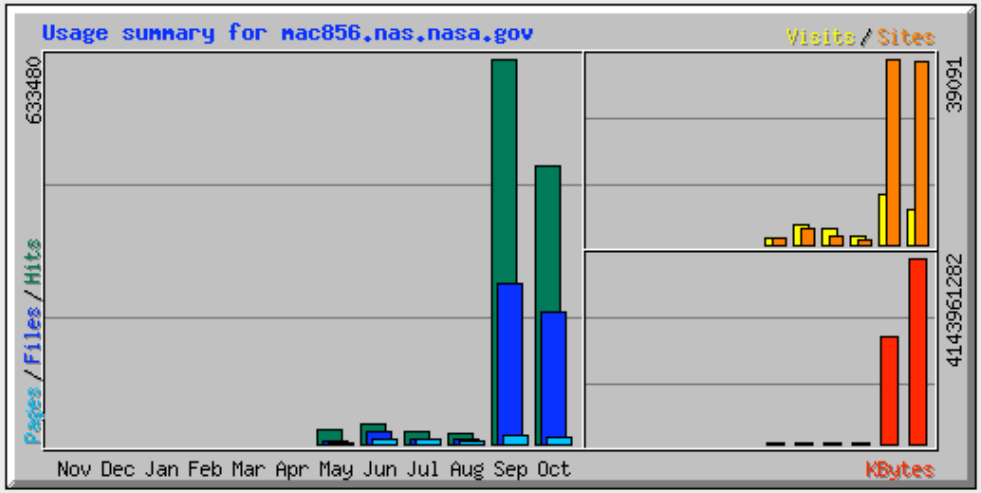


opensource.gsfc projects



Experiences so Far

- Initial four pilot projects released: 1/04



Summary by Month

Month	Daily Avg				Monthly Totals					
	Hits	Files	Pages	Visits	Sites	KBytes	Visits	Pages	Files	Hits
Oct 2004	30379	14552	676	481	38359	4143961282	7224	10145	218280	455696
Sep 2004	21116	8831	498	352	39091	2376169822	10578	14967	264942	633480
Aug 2004	574	256	187	55	1194	26423987	1720	5799	7952	17823
Jul 2004	654	294	245	106	1911	8928120	3302	7618	9137	20281
Jun 2004	1124	628	242	138	3476	23108995	4169	7270	18861	33740
May 2004	993	204	129	72	1448	7121060	1594	2844	4503	21858
Totals						6585713266	28587	48643	523675	1182878

The Big Hit So Far: WorldWind

- Ames Learning Technologies
  - NASA education mission
- WorldWind written with MS .net -- runs on MS Windows platforms
- Does interactive 3-D graphics: displays the globe with earth science data
- Communicates with data servers via the WMS protocol

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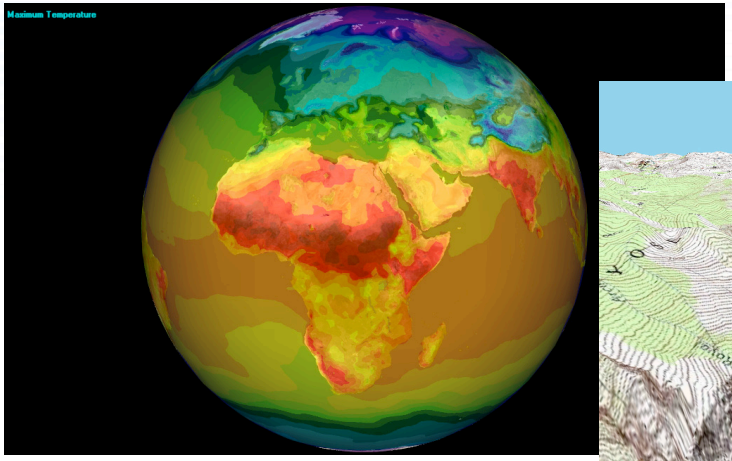
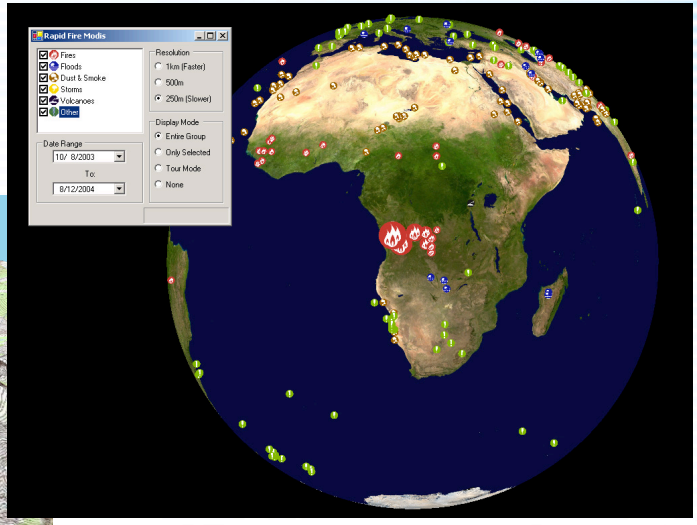
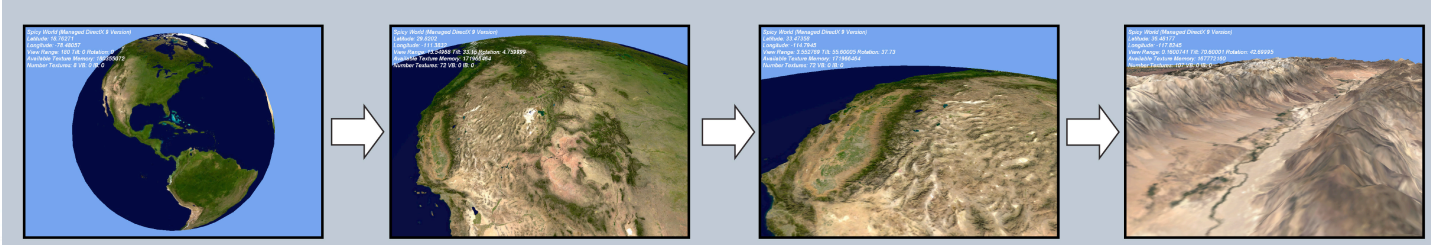
WorldWind

- Over 100K downloads!







Challenges

- How do we quantify impact?
  - old software release options required user registration -- count registrants
  - OS requests registration, but not required
- Handling cases where software package includes software distributed under GPL
  - GPL trumps other OS licenses (e.g., NOSA)

Conclusion

- NASA now has an Open Source option for software release
- NASA legal has stepped up to develop a usage agreement that we can use for OS releases -- the NOSA
- ARC and GSFC now have sites dedicated to OS releases
- Pace of OS releases beginning to pick up

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